# A small *dōu*-sage of syntax *měi* be necessary

## Quantification in Mandarin

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# *mei* sentences with *dou*

In Mandarin, the quantificational element *mei* (≈ 'every') selects for a numeral + classifier + noun complex.

*mei* subjects must normally be followed by a mysterious element *dou* within a clause in Mandarin.

(1) ***mei-(yi)-ge*** *haizi *(**dou**) qu-le gongyuan*
mei-one-CLF child DOU go-PRF park
'Every child went to the park.'

# *mei* sentences without *dou*

However, there is an exception: if the clause has a object that is a numeral + classifier + noun complex (without a quantifier), *dou* seems to be optional (first observed in Huang 6):

(2) ***mei-(yi)-ge*** *haizi hua-le* ***yi-fu-hua***
every-one-CLF child draw-PRF one-CLF-picture
'Every child drew one picture.'

# Questions for today

- Why/when is *dou* necessary?
- What (if anything) is the difference in meaning with/without *dou*?
- What (if anything) are the differences in structure between the two constructions?
- More generally: what is the division of labour w.r.t. syntax and semantics in Mandarin quantification?

# The broader questions

What kinds of processes are involved in structure-building in syntax? How does structure-building interface with its input (e.g. the lexicon) and its output (e.g. LF)?

If we can answer this, we may be able to shed light on both the syntax and the semantics of Mandarin clausal and nominal structure.

# A primer on Mandarin word order

Mandarin is SVO by default, but easily accommodates OSV.

This is likely because Mandarin underlying has a topic-prominent clausal structure (Li and Thompson).

We take this to mean that subjects are topics by default, but topicalization of other arguments may be achieved through marked word orders.

# A primer on Mandarin word order (contd.)

Other orders like SOV are possible with additional morphology.

*dou* always precedes the verb and its aspect markers. So if *dou* is present, *all else being equal*, the word order of a transitive clause is:

(3) S – DOU – V – O

# A complication: other universal quantifiers

Other universal quantifiers, like *suoyou* ‘all’ work differently.

While *mei* (4a) attaches to numeral complexes, *suoyou* attaches directly to bare nouns (4b).

(4) a. *mei yi *(ge) haizi*
mei one CLF kid
‘every kid’

b. *suoyou (*yi ge) (de) haizi*
suoyou one CLF DE kid
‘all (of the) kids’

# Other universal subjects require *dou*

Regardless of what is in the object position, other universal quantifiers require *dou* if they are in the subject position.

(5) a. *suoyou-(de) haizi *(dou) qu-le gongyuan*
suoyou-DE child DOU go-PRF park
'All (of the) kids went to the park.'

b. *suoyou-(de) haizi *(dou) hua-le yi-fu-hua*
suoyou-DE child DOU draw-PRF one-CLF-picture
'All (of the) kids (each) drew one picture.'

# What is *dou* actually doing?

(6a) and (6b) with/without *dou* seem to be semantically equivalent:

(6) a. ***mei-yi-ge*** *haizi hua-le* *yi-fu-hua*
MEI-one-CLF child draw-PERF one-CLF-picture
'Every child drew 1 picture.'

b. ***mei-yi-ge*** *haizi* ***dou*** *hua-le* *yi-fu-hua*
MEI-one-CLF child DOU draw-PERF one-CLF-picture
'Every child drew 1 picture.'

# What is *dou* actually doing?

However, *mei*-subjects with and without *dou* do produce different interpretations (13).

(7) ***Scenario 1:*** The teacher is giving instructions to the 4 children in an art class:

a. ***mei-liang-ge*** *haizi hua yi-fu-hua!*
MEI-two-CLF child draw one-CLF-picture
'Groups of 2 children draw 1 picture!'

b. ***mei-liang-ge*** *haizi* ***dou*** *hua yi-fu-hua!*
MEI-two-CLF child DOU draw one-CLF-picture
'Every conceivable pair of children, draw 1 picture!'

# In a context with 4 children *a,b,c,d*

(7a) would be true iff any of the three possibilities is true:

1. $\{\{a, b\}, \{c, d\}\}$ drew 1 picture
2. $\{\{a, c\}, \{b, d\}\}$ drew 1 picture
3. $\{\{a, d\}, \{c, b\}\}$ drew 1 picture

(7b) would be true iff

$\{\{a, b\}, \{c, d\}, \{a, c\}, \{b, d\}, \{a, d\}, \{c, b\}\}$ drew 1 picture.

# What is *dou* actually doing?

What this shows is that *dou* is semantically associated with a specific quantified nominal.

We will refer to this as *dou*'s semantic ASSOCIATE from here.

We will showcase one of the most interesting semantic effect of *dou* with respect to the cumulativity/distributivity effect.

# Singular universals: cumulative or distributive?

Singular universals, e.g. English *every* QPs, German *jed-* QPs, when co-occurring with plural expressions, exhibit a famous semantic asymmetry (Schein 11, Champollion 2):

(8) Context: There are two teachers, Ann and Bella, and two kids, Charlie and Dana.

a. ***distributive*** scenario: *a* rewarded *c* and *d*, *b* rewarded *c* and *d*.

b. ***cumulative*** scenario: *a* rewarded *c*, *b* rewarded and *d*.

# Cumulativity asymmetries

(9) *Every teacher* rewarded *(the) two kids*.

a. ***distributive*** scenario TRUE

b. ***cumulative*** scenario FALSE

(10) *(The) two teachers* rewarded *every kid*.

a. ***distributive*** scenario TRUE

b. ***cumulative*** scenario TRUE

# Cumulativity asymmetries tied to scope

- *every* QPs $>$ plural NPs: blocks cumulativity
- plural NPs $>$ *every* QPs : allows for cumulativity

Assumption: **such an asymmetry reflects scope**, **viewed as c-command at LF** (Champollion 2, Schmitt 12, Haslinger and Schmitt 4).

# Cumulativity and Distributivity

Distributive vs. cumulative distinction: whether **the part structure** of lower pluralities can be **preserved**.

(11) $P = \text{REWARD } c + \text{REWARD } d, \quad X = a + b$

a. distributive: $\{< \text{REWARD C + REWARD D}, a >, < \text{REWARD C + REWARD D}, b >\}$

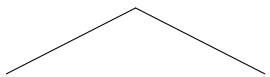
b. cumulative: $\{< \text{REWARD C}, a >, <, \text{REWARD D}, b >\} \vee \{< \text{REWARD C}, b >, <, \text{REWARD D}, a >\} \vee \{< \text{REWARD C}, b >, < \text{REWARD C}, b >, < \text{REWARD D}, a >\} \vee \ldots$

# Plural projection built into semantic composition

The core idea: if a node $\alpha$ dominates an plural expression $\beta$, the part structure of $\beta$ 'projects' up to $\alpha$, i.e. $\alpha$ also denotes a plurality of values.

For example:

(12) $\{\text{REWARD}(c)_{<et>} + \text{REWARD}(d)_{<et>}\}$



$\{\text{REWARD}_{<e,et>}\}$ $\{c_e + d_e\}$

(12)

# Semantic background, but informally

Ontology:

- All semantic domains contain pluralities.
- A cross-categorical sum-operation $+$ for any type.
- For any type $a$ there is a higher type $a^*$ of 'plural sets'. Plural sets are written as $[a+b]$ instead of $\{a+b\}$.

  Note: $[a+b] \neq a+b \neq [a,b]$

(13) a. $D_e = \{a, b, c, a+b, a+b+c \ldots\}$

b. $D_{<et>} = \{\textsc{cry}(x), \textsc{laugh}(x), \textsc{cry}(x) + \textsc{laugh}(x) \ldots\}$

c. $D_{e^*} = \{[a], [b], [c], [a,b], [a+b], [a+b+c], [a, a+b] \ldots\}$

# Cumulative truth-conditions

Why do we need the higher type of plural sets?

Recall: Cumulative truth conditions are compatible with several possible ways of combining two pluralities.

(14) *(The) two teachers* rewarded *every kid*.

(15) $\{[\textsc{reward}(c)(a) + \textsc{reward}(d)(b)],$
$[\textsc{reward}(c)(b) + \textsc{reward}(d)(a)],$
$[\textsc{reward}(c)(a) + \textsc{reward}(d)(a) + \textsc{reward}(d)(b)], \ldots\}$

(15) is true *iff* **at least one element** in the plural set is true.

# *every* QPs: how is cumulativity blocked

Assumption: The distributivity effect is built into the lexical entry of *every* (4).

(16) Every teacher rewarded (the) two kids.

a. $[\![\textit{every teacher}]\!]([\textsc{reward}(c) + \textsc{reward}(d)])$

b. For each atomic teacher *x*, $[\![\textit{every}]\!]$ **takes a *P* and applies each part of *P* to *x***:

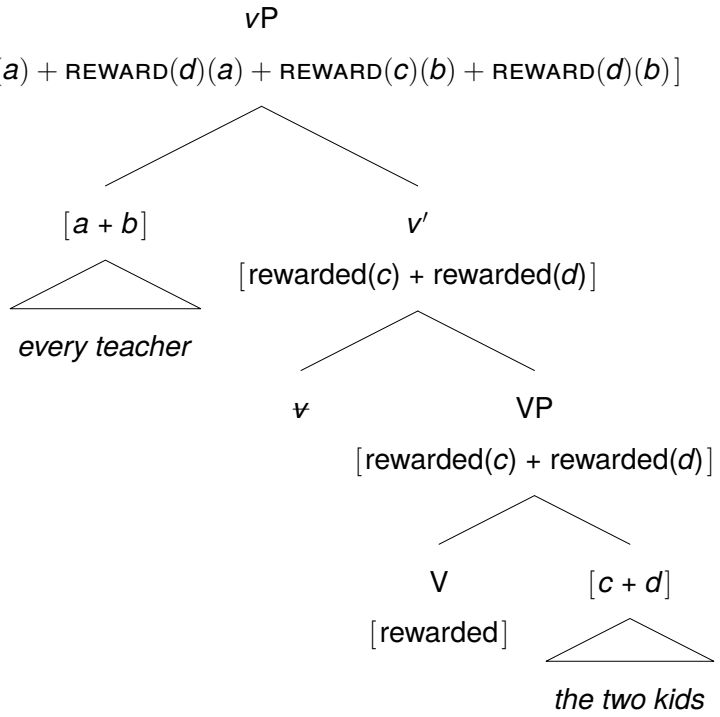
$\textsc{reward}(c)(a) + \textsc{reward}(d)(a), \textsc{reward}(c)(b) + \textsc{reward}(d)(b)$

c. then takes the **sum**:

$[\textsc{reward}(c)(a) + \textsc{reward}(d)(a) + \textsc{reward}(c)(b) + \textsc{reward}(d)(b)]$

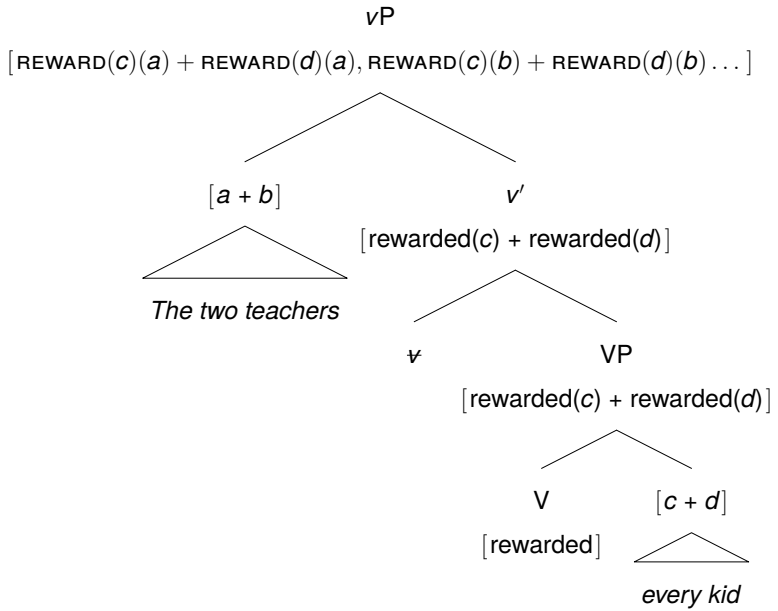
# *every* QPs: how is cumulativity blocked

(17) $[\textsc{reward}(c)(a) + \textsc{reward}(d)(a) + \textsc{reward}(c)(b) + \textsc{reward}(d)(b)]$



# Cumulation possible object every QPs

(18) (The) two teachers rewarded every kid.



# What about Mandarin *mei*?

Like *every*, *mei* in subject positions only allow distributive readings, regardless of the presence of *dou*.

(19) a. ***mei-yi-ge*** *haizi hua-le* *liang-fu-hua*
MEI-one-CLF child draw-PERF two-CLF-picture
'Every child drew 2 picture.'

b. ***mei-yi-ge*** *haizi* ***dou*** *hua-le* *liang-fu-hua*
MEI-one-CLF child DOU draw-PERF two-CLF-picture
'Every child drew 2 picture.'

So what is *dou* doing here?

# *dou* blocks cumulativity

Crucially, movement of an object past *dou* seems to block cumulativity:

(20) *zhe liang-ge laoshi jiangli-le **mei**-(yi)-ge haizi*
DEM 2-CLF teacher reward-PRF MEI-one-CLF child
'The two teachers rewarded **every** child.'

***cumulative possible***

(21) *zhe liang-ge laoshi **mei**-(yi)-ge haizi dou jiangli-le*
DEM 2-CLF teacher MEI-one-CLF kid DOU reward-PRF
'The two teachers each rewarded **every** child.'

***only distributive***

# One possibility

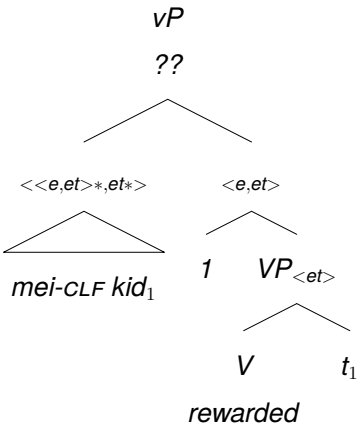
The presence of *dou* forces its associate to move out of *v*P.

The process of cumulation is interrupted since traces of *mei* QPs only range over atoms (2). The denotation of *v*P is not a plural set of values.

**(Tentative) Hypothesis**: *dou* type-shifts things of any type *a* to a higher type $a^*$.

# Type mismatch: *mei* without *dou*

(22) two-CLF-teachers [mei-clf-kid$_1$ *rewarded* $t_1$*]*.




Issue: If *dou* only lifts things to a higher type, then how to capture the blocking of cumulativity?

# A new take on *dou*

Recall:

- *every* QPs $>$ plural NPs: blocks cumulativity
- plural NPs $>$ *every* QPs : allows for cumulativity

**(Modified) Hypothesis**: *dou* makes a low topic position available for QR, which allows mei-QPs to scope over plural NPs.

# A primer on ‘scope frozenness‘ in Mandarin

‘Simple transitives’ in Mandarin seem to be unambiguous.

(23) 2-CLF teacher rewarded mei-CLF kid. $2 > \forall, *\forall > 2$

Mandarin relative clauses present a scope puzzle which challenges the claim that Mandarin is scope rigid.

(24) I bought

# A new take on the co-occurrence puzzle

In the plural projection program (12), type-shifting operations are assumed since **every QPs takes plural sets as arguments**.

(25) $[\![\textit{every teacher}]\!](\Uparrow [\![\textit{rewarded}]\!])$

This explains how every QPs combine with intransitive predicates.

(26) a. Every kid laughed.

b. $[\![\textit{every kid}]\!](\Uparrow [\![\textit{laughed}]\!])$

# A new take on the co-occurrence puzzle

We assume that the reason why *dou* is needed for *mei* QPs is that type-shifts like $\Uparrow$ don't come for free in Mandarin.

(27) ***mei-(yi)-ge*** *haizi *(**dou**) xiao-le*
mei-one-CLF child DOU laugh-PRF
'Every child laugh.'

# Interim summary

The takeaway is that a number of incompatibilities exist already in the LF — the distributions that we see can largely be attributed to semantic factors.

However, the fact that (at least some speakers) *require* movement of universal QPs raises some questions. Even when it is trivial, the semantic effect of *dou* is forced to apply by something in the syntax.

# Some syntactic assumptions

We will suggest that movement (or *Internal Merge*) is obligatory in some cases, in effect triggering the semantic effects that we see.

Recently, debate has arisen as to whether Merge is whether Merge is *triggered* by certain features, *licensed* under certain syntactic conditions, or applies completely freely, with ungrammatical derivations being filtered at the interfaces.

# Free Merge isn't free

Adopting the latter perspective, we would have to say that at least some issues of syntactic distribution are actually filtered at the interface with LF/semantics.

However, proposed mechanisms like semantic filtering have not provided a satisfactory answer as to why, for example, predicative nouns and adjectives are different syntactic categories in English, when they are semantically both of the type $\langle e, t \rangle$.

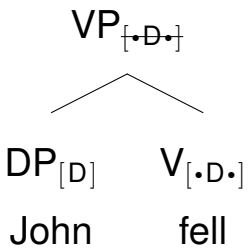
# Licensing Merge in the syntax

We're left with the alternative, viz. that some kinds of selection do occur in the syntax. Here, we'll try a modified projection-by-selection approach (3; 1; 14),

For example, we can say verbs have some *syntactic property* that that licenses Merge with a DP, but DPs themselves do not need any particular property to license Merge with a verb.

# A simple example

(28)




So in the (simplified) structure for a VP like *John fell* (28), a verb V is able to select a complement DP, because it has a feature $[\bullet \mathrm{D} \bullet]$ which may be *checked* by any element bearing the feature $[\mathrm{D}]$ (see also Heck and Müller 5).

# Obligatory operations

While c(ategory)-selection seems necessary to some extent, it doesn't need to be too aggressive. Other kinds of syntactic operations (namely Agree) seem to be obligatory wherever possible within a derivation, but able to fail elsewhere (10) .

We can thus say that $[\bullet \mathrm{F} \bullet]$ features only need to be checked *where possible* (8; 9). Regardless of whether a feature remains checked/unchecked, the derivation may still fail independently at LF, that is, due to s(emantic)-selection.

# Feature checking and functional projections

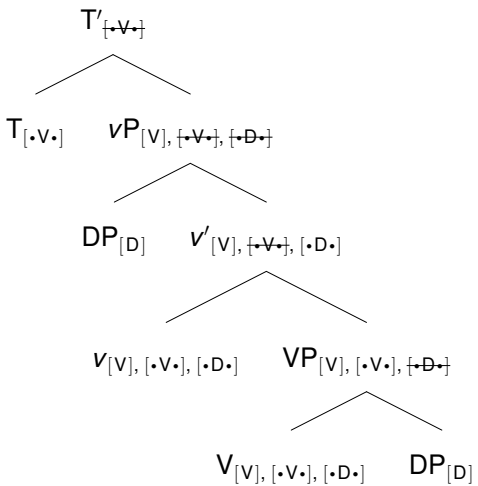
Allowing feature checking to fail allows for interesting analyses: categories that seem to be fundamentally different in the semantics can be collapsed into single feature structures in the syntax.

For instance, both *v* and V could be thought of as having the features $\{[\mathrm{V}], [\bullet \mathrm{V} \bullet], [\bullet \mathrm{D} \bullet]\}$ in English — the only difference syntactically is that *v* checks $[\bullet \mathrm{V} \bullet]$ but V does not.

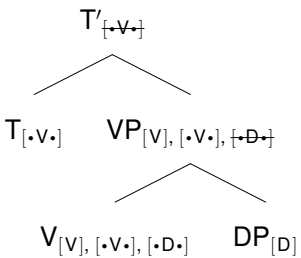
# Functional projections as reprojections

That way, T only needs a single selectional feature [•V•], e.g. if one wants to assume that unaccusatives don't project *v*.

(29) a. Transitive verb




b. Unaccusative verb

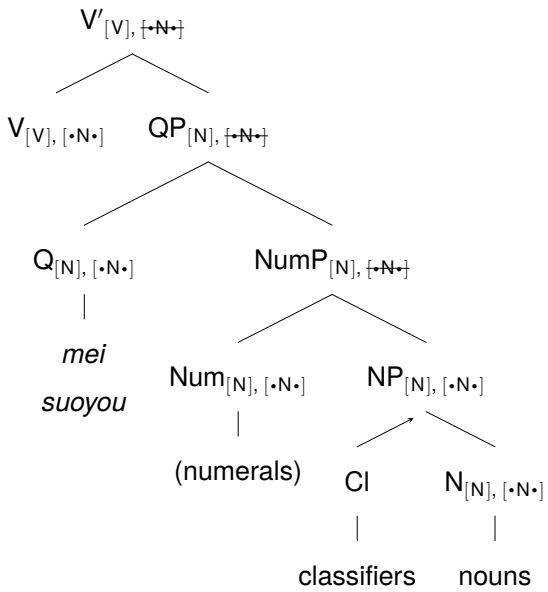


# Nominal domain in Mandarin

We can say, e.g., that verbs in Mandarin select arguments with the category feature $[\mathrm{N}]$, and NPs, NumPs, and QPs all have the features $\{[\mathrm{N}], [\bullet\mathrm{N}\bullet]\}$.

S-selection does most of the work; the syntax just allows arguments to be of various sizes.

(30)



# Capturing *dou*-movement

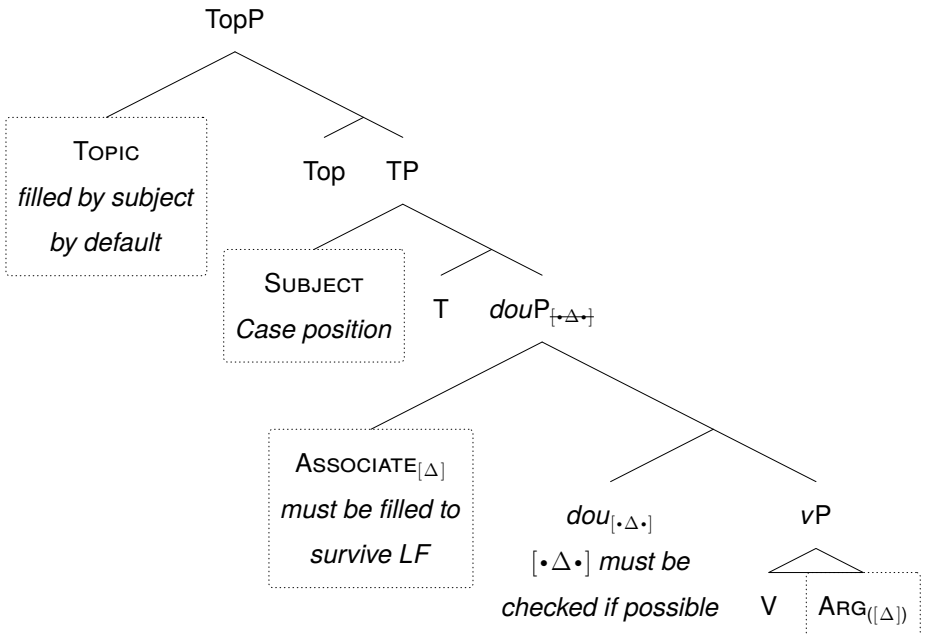
This can capture the fact that that some speakers require universal objects to move if *dou* has merged and the subject is not universal.

We suggest that universal arguments have an additional feature $[\Delta]$, and *dou* is an element on the clausal spine that has a matching selectional feature $[\bullet\Delta\bullet]$.

This means that if both a univeral argument and *dou* merge, then the (closest) universal argument *must* merge with *dou*, and is interpreted as its ASSOCIATE at LF.

# A simplified clausal structure of Mandarin

(31) NP positions along the clausal spine



# The interdependence of QPs and *dou*

| | *dou* merges | *dou* doesn't merge |
|---|---|---|
| Argument with $[\Delta]$ | Obligatory movement interrupts plural projection. | Fine for *mei* unless it scopes over a singularity, type mismatch for other QPs. |
| No arguments with $[\Delta]$ | Type mismatch at LF when *dou*P is selected. | Nothing happens. |

# One prediction: multiple *mei*'s

If we're on the right track, sentences like the ones below with multiple *mei*'s should be ambiguous w.r.t. which QP is *dou*'s ASSOCIATE.

(32) a. ***mei-(yi)-ge*** *laoshi dui* ***mei-(yi)-ge*** *xuesheng* ***dou*** *hen hao*
MEI-one-CLF teacher to MEI-one-CLF student DOU very kind
'Every teacher treats every student very kindly.'

b. ***mei-(yi)-ge*** *haizi (ba)* ***mei-(yi)-ben*** *shu* ***dou*** *kan-wan-le*
MEI-one-CLF child BA MEI-one-CLF book DOU read-finish-PRF
'Every child has read every book completely.'

c. ***mei-(yi)-ge*** *xuesheng* ***mei-(yi)-tian dou*** *zoulu qu xuexiao*
MEI-one-CLF student MEI-one-day DOU walk to school
'Every child walks to school everyday.'

# Outlook

We suggest that there are ways of explaining the distribution of elements that relies heavily on s-selection, but does not cut out c-selection entirely.

Our investigation indicates *dou*-movement is indeed triggered/licensed for some (but not all) speakers, and relevant semantic effects are observed. We propose that this is because it is obligatory in those grammars.

However, further work is needed to discern why two grammars seem to exist: one with obligatory *dou*-movement, and one without, to capture speaker variation.

# Thank you!

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